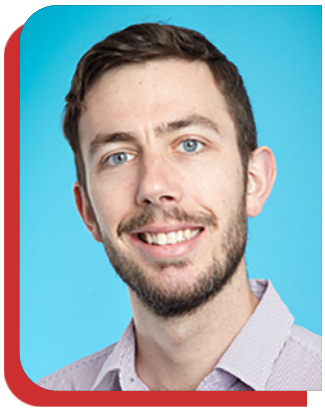
RECENT STUDIES IN HYPERTENSION

Dietary fibre intake and levels in clinical guidelines – why it matters



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Lifestyle interventions are described as first-line therapy in national, regional, and international hypertension guidelines (e.g., the ISH 2020 guidelines[1]). Within lifestyle factors, diet is recognised as a critical risk factor for hypertension, with some diets able to lower and others to increase blood pressure (BP). Dietary guidelines for hypertension usually refer to sodium, potassium, and overall fruit, vegetable, and grain intake. However, a critical macronutrient missed in most guidelines is fibre. Dietary fibre is negatively associated with cardiovascular disease (CVD) death, with a critical mechanism being a decrease in BP.[2] The global fibre intake averages ~11g/day, which is insufficient.[3] Independently of economic income, this is a common cause of dietary risk factor for death,[3] particularly for low- and middle-income countries.[4] In a recent paper published in Hypertension,[5] we reviewed the evidence that fibre lowers BP, the mechanisms involved, how much fibre should be indicated for hypertensive patients, and how to support patients in achieving this intake. We hope this will drive future discussions to include fibre in hypertension guidelines, as supported by the recent ISH lifestyle management of hypertension position paper.[6] Below, we summarise some of the key take-home messages of our paper (**Figure**).

What is fibre?

Fibre is any carbohydrate neither digested nor absorbed in the small intestine and has some degree of polymerisation (>3 or >10, depending on the jurisdiction). Most fibres can be divided broadly into non-starch polysaccharides in the plant cell wall (e.g., soluble and insoluble fibres) and resistant starches in the starch granule.

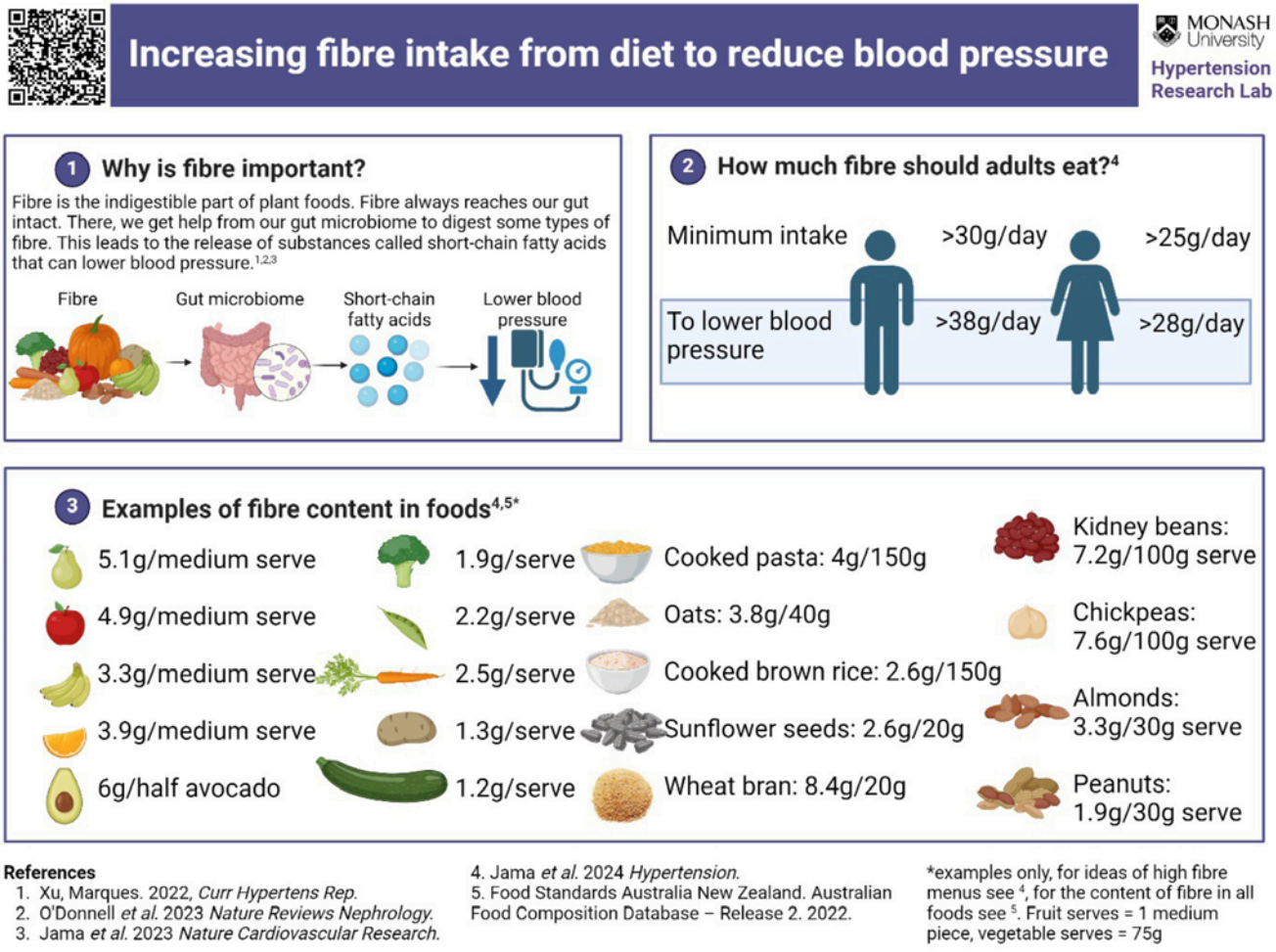
Evidence that fibre lowers BP

The most recent and robust evidence comes from a meta-analysis published in 2022, which classified the evidence as high Grading of Recommendations, Assessment, Development, and Evaluations (GRADE).[7] This included 7,469 prospective participants with CVD (followed for ~8.6 years) and 12 randomised clinical trials with 648 participants with hypertension and/or CVD across Asia, Europe, North America, and Oceania.[7] Assuming linearity between fibre intake and all-cause mortality risk, a 14% risk reduction per every 10g of fibre consumed was estimated in patients with CVD – for high-fibre consumers, this was calculated to prevent 60 deaths per 1,000 people.[7] Every increase of 5g in fibre intake was calculated to reduce systolic BP by –2.8 mmHg (95% CI: –3.8 to –1.8) and diastolic BP by –2.1 mmHg (95% CI: –3.0 to –1.2).[7] This response was larger in hypertensive patients without CVD, independently of BP-lowering medication, with every extra 5g/fibre/day estimated to reduce systolic BP by –4.3 mmHg (95% CI: –5.8 to –2.8) and diastolic BP by –3.1 mmHg (95% CI: –4.4 to –1.7).[7]

How fibre lowers BP?

Not all types of fibre may have the same BP-lowering effect – this may be dictated by their physicochemical characteristics: solubility (i.e., whether they can dissolve in water), viscosity (i.e.,

Figure. Summary and key recommendations of our recent review.[5]



resistance to flow), and fermentability (i.e., ability to be fermented by the gut microbiota).8 Evidence suggests fibre fermentability is essential for its BP-lowering effect. By reaching the large intestine intact, fermentable fibres (e.g., resistant starches) are metabolized by the gut microbiota, producing microbial metabolites known as short-chain fatty acids (SCFAs) as by-products. These lower BP in animal models of hypertension (e.g. [9,10]) and a randomised clinical trial[11] (**Figure**). The exact mechanisms by which SCFAs lower BP are still being studied, with promising results regarding G-protein coupled receptors and the immune system.[12]

Ideal fibre levels

There are no unified recommendations for fibre intake to prevent non-communicable diseases (NCDs) across countries. A meta-analysis estimated the general population should consume at least 25-29g of fibre/day as an 'adequate intake' for the prevention of all-cause and CVD death,[2] and thus was recommended in the ISH lifestyle position paper.[6] Based on a random-effects model, 35-39g fibre/day provided further benefits with reduced mortality.[2] Sex differences were not considered, so sex-specific recommendations cannot provided. According to the Australian 'Suggested Dietary Target' calculated to reduce the risk of NCDs such as hypertension[13] and considering the added BP-lowering benefit of each 5-10g of fibre, we recommend 28g fibre/day for women and 38g fibre/day for men diagnosed with hypertension. To facilitate achieving this, we provided tables with the amount of fibre per food item/serve (som shown in the figure) and examples of menus containing adequate fibre intake in the paper.

Key remaining data gaps

Many fundamental questions in this field remain to be answered by future studies, which include:

1. What type of fibre or fibre combinations have the biggest impact on lowering BP?
2. Does everybody benefit from fibre intake equally? Are there differences regarding sex, ethnicity, age, microbiome, etc, in fibre intake responses and their associated mechanisms?
3. What levels of fibre do children and adolescents need to eat to prevent or lower BP?

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